are watered by the rains of the southwest monsoon. In the plains region of southern Manchuria extremes of heat and cold are marked, although not so great as in the more northern parts of the country. The temperature rises above 90° in summer and falls to 10° or more below zero in winter, and rivers are frozen during the four winter months. After a short spring hot weather begins, which is separated from the severe winter by an autumn of about six weeks duration.

Niuchwang, Manchuria, which has about the same latitude as New York, has an annual mean temperature of 47.2°, as compared with 52.6° at New York. The monthly mean temperature continues below freezing at Niuchwang during December, January, February, and March, but at New York during January and February only. In July and August the mean temperature at Niuchwang, 77.7° and 74.4°, is 4.1° and 4.0° higher, respectively, than the means of the corresponding months for New York.

Korea is a mountainous, well-watered country, with practically no plain regions. Over the northern part of the peninsula winter temperatures fall to 10° to 15° below zero and the rivers are frozen for several months. In southern Korea temperatures fall nearly to zero during the winter months, and snow falls during a considerable part of the winter as far as the southern point of the peninsula.

Wonsan, the main port on the northeastern coast, near the latitude of Washington, D. C., has an annual mean temperature of 50.2°, as compared with 54.9° at Washington, and its July mean is higher than that of Washington. Owing to the proximity of Wonsan to the sea and its sheltered position to the eastward of the principal mountain range of Korea, its temperatures month by month correspond closely with the Washington record; each place presents but two months, January and February, with mean temperatures below freezing; in February the Wonsan temperature averages about 2° higher than that of Washington.

Fusan, in extreme southern Korea, has about the latitude of North Carolina, and its annual mean temperature, 54.5°, is about 5° lower than that of Norfolk, Va. The winter monthly mean temperatures do not fall below freezing at Fusan, the lowest, 33°, being that for January, as compared with 40.4° at Norfolk. The August mean temperature at Fusan, 76.8°, is 0.2° higher than the August mean at Norfolk.

Chemulpo, on the west-central coast of the Korean Peninsula, and Seoul, the capital, have about the same latitude as central Virginia. Seoul has the same annual mean temperature as Washington, with lower winter and higher summer temperatures. In January the monthly mean for Seoul is 24.3° as compared with 31.8° at Washington, and in July the Seoul mean is 81.1°, and the Washington mean 77°. Chemulpo temperatures average several degrees below those of Washington in winter, but correspond very closely with those of the same latitude on our Atlantic coast during the balance of the year.

THE WINTER OF 1903–4.

By W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

The winter of 1903–4 was an unusually cold one over the country to the eastward of the Mississippi River. This was not due to the occurrence of very low minimum temperatures, but to the number and succession of days whose mean temperatures continued below the normal. Over the Rocky Mountain slope district and thence westward to the Pacific Ocean, the mean temperature for each district was generally above the normal, and the average departures for the winter ranged from +0.6° to +3.9°. The details as to months and districts are shown in Table 1.

In the upper Mississippi Valley, and in all districts east of the Mississippi River, the mean temperature for each of the months of December, January, and February, except February in the Florida Peninsula, was below the normal, and generally to a marked extent; the departures of the averages of the whole three months ranged from —1.9° in the Florida Peninsula to —7.5° in the Lake region.

From month to month as the winter advanced the minus departures from the normal increased in the New England and middle Atlantic districts; they diminished in the Florida Peninsula, south Atlantic, and east Gulf districts; and varied in the Ohio Valley and Tennessee, Lake region, and upper Mississippi Valley.

TABLE 1.—*Departures from the normal for the several months and for the whole winter.*

Districts.	Departures from normals.			Winter.
	December, 1903.	January, 1904.	February, 1904.	
	°	°	°	°
New England	— 4.0	— 6.0	— 6.5	— 5.5
Middle Atlantic	— 4.8	— 6.1	— 7.4	— 6.1
South Atlantic	— 5.5	— 4.7	— 4.0	— 4.7
Florida Peninsula	— 4.8	— 1.6	+ 0.6	— 1.9
East Gulf	— 5.2	— 3.0	— 0.3	— 2.8
West Gulf	— 2.1	+ 0.5	+ 2.4	+ 0.3
Ohio Valley and Tennessee	— 7.6	— 3.9	— 5.0	— 5.5
Lower Lake	— 6.8	— 6.7	— 9.1	— 7.5
Upper Lake	— 7.0	— 5.3	—10.2	— 7.5
North Dakota	+ 0.2	+ 1.8	— 8.3	— 2.1
Upper Mississippi Valley	— 6.5	— 3.6	— 7.2	— 5.8
Missouri Valley	— 2.8	+ 1.0	— 3.3	— 1.7
Northern slope	+ 4.9	+ 6.5	— 0.1	+ 3.8
Middle slope	+ 1.4	+ 1.9	+ 4.2	+ 2.5
Southern slope	+ 1.8	+ 2.0	+ 7.9	+ 3.9
Southern Plateau	+ 1.0	— 0.1	+ 5.0	+ 2.0
Middle Plateau	+ 1.4	— 0.9	+ 3.7	+ 1.4
Northern Plateau	— 1.1	+ 5.6	+ 5.2	+ 3.2
North Pacific	+ 0.6	+ 2.4	— 0.8	+ 0.7
Middle Pacific	+ 1.4	+ 1.0	— 0.6	+ 0.6
South Pacific	+ 1.5	+ 1.6	+ 0.4	+ 1.2

The mean temperature was above the normal during each of the winter months in the middle and southern slope and south Pacific districts; in December and January in the north and middle Pacific and northern slope districts and North Dakota; in December and February in the northern and middle Plateau districts; and in January and February in the west Gulf districts.

At only two stations having twenty-five years or more of data was the record of lowest temperature broken.

At the following stations the minimum temperatures during January, 1904, were lower than during any preceding January since the establishment of the station:

TABLE 2.

Station.	No. of years of record.	Previous record exceeded by—
		°
Evansville, Ind.	8	1
Hannibal, Mo.	12	1
Harrisburg, Pa.	16	1
Richmond, Va.	6	1
Rochester, N. Y.	33	2
Detroit, Mich.	34	2
Northfield, Vt.	18	6
Minneapolis, Minn.	14	7
Binghamton, N. Y.	8	15

No record of minimum temperatures at a regular Weather Bureau station was broken during the months of December and February.

Unusually high maximum temperatures were reported during December, 1903, from portions of Montana, Wyoming, and interior California; during January, 1904, from the mountains of West Virginia, and portions of the region to the westward of the Mississippi River; and during February, 1904, from portions of the slope, Plateau, and Pacific, and west Gulf districts, and, notwithstanding the marked negative departures from the mean for the month, in portions of Tennessee, Virginia, New York, and Maine. The details of these maximum temperatures are given in Table 3.

TABLE 3.—*Amounts by which the highest temperatures previously recorded for the specified stations and months were exceeded during the corresponding month of 1903–4.*

Station.	Month.	Number of years of record.	Previous record exceeded by— °F.	Station.	Month.	Number of years of record.	Previous record exceeded by— °F.
Fresno, Cal	Dec., 1903	16	1	Meridian, Miss	Feb., 1904	15	1
Lander, Wyo	do	12	4	Palestine, Tex	do	23	1
Miles City, Mont	do	12	4	Richmond, Va	do	7	1
Amarillo, Tex	Jan., 1904	13	1	Tacoma, Wash	do	8	1
Carson City, Nev	do	17	1	Wichita, Kans	do	16	1
Dodge, Kans	do	30	1	Yuma, Ariz	do	29	1
Fresno, Cal	do	17	1	Eastport, Me	do	32	2
Corpus Christi, Tex	do	18	2	Pueblo, Colo	do	16	2
Lander, Wyo	do	13	2	Roseburg, Oreg	do	27	2
Palestine, Tex	do	23	2	Valentine, Nebr	do	18	2
San Luis Obispo, Cal	do	11	2	Albany, N. Y	do	31	3
Walla Walla, Wash	do	19	2	El Paso, Tex	do	26	4
Port Crescent, Wash	do	10	3	Binghamton, N. Y	do	8	5
San Diego, Cal	do	33	3	Dodge, Kans	do	30	5
Elkins, W. Va	do	6	4	Abilene, Tex	do	19	9
Helena, Mont	do	25	4	Amarillo, Tex	do	13	9
Fort Worth, Tex	do	6	5	Oklahoma, Okla	do	14	10
Knoxville, Tenn	Feb., 1904	34	1	Fort Worth, Tex	do	6	16
Little Rock, Ark	do	25	1				

Table 4 shows the dates on which the average temperature of each entire district was below the normal for that district, and Table 5 shows when it was decidedly below, during the several months.

TABLE 4.—*Dates when the temperature was below the normal throughout each district.*

Districts.	December.	January.	February.
New England	1, 2, 4–6, 11, 14–19, 23, 26–31	1–6, 11, 17–20, 25–30	1–6, 8–21, 25–27
Middle Atlantic	1–4, 6–12, 14–19, 26–31	3–12, 14–20, 25, 27–31	1–5, 9–21, 25–27
South Atlantic	1–4, 6–12, 14–19, 21–23, 26–28, 30	3–8, 12, 14–16, 18–20, 24, 25, 27–31	1–4, 9–14, 16–18, 20, 21, 27, 28
Florida Peninsula	1–12, 15–18, 21–23, 26–28, 30–31	1, 5, 6, 8, 9, 14–16, 24, 25, 30	1–4, 12, 13, 15, 24, 25
East Gulf	1–11, 13–18, 21–23, 26, 27, 30, 31	3–7, 13, 14, 23–31	1–4, 10–13, 15–17, 20–23
West Gulf	1–7, 9–11, 13–17, 20, 26	3–5, 23, 26–31	1, 10–12, 18–22
Ohio Valley and Tennessee	1–18, 22, 23, 25–31	3, 7, 13–15, 17, 18, 23–31	1–4, 8–13, 15–22, 25
Lower Lake	1–11, 13–19, 22, 25–31	1–6, 10–12, 15, 17–19, 24–30	1–4, 8–13, 15–20, 24–26
Upper Lake	1, 2, 5, 6, 8–17, 22, 25–31	1–5, 17, 24–31	1–4, 7–12, 14–20, 22, 24–27
North Dakota	4, 8, 11–16	1–4, 20, 23–28	2–4, 6–11, 13–16, 21–26
Upper Mississippi Valley	1, 2, 4, 5, 8–17, 22, 25, 26, 28–30	2–4, 23–31	1–4, 8–12, 14–22, 25, 26
Missouri Valley	1, 4, 5, 8–17	2–4, 21–29, 31	2, 3, 7–11, 14–19, 21, 25, 26
Northern slope	4, 11–14	2, 20, 23–25	2, 7–10, 14, 25
Middle slope	4, 5, 8, 12–14	2–4, 21–23, 25–29, 31	8–10, 16–19, 21
Southern slope	4, 5, 8, 9, 13–16	2–4, 6, 22, 23, 25–31	9–11, 18, 19
Southern Plateau	4, 5	3, 5, 6, 21–23, 29, 30	6–10
Middle Plateau	4–10, 15, 24, 25	9, 20, 21, 23, 25–31	8–10
Northern Plateau	3–10, 26, 27	25	9
North Pacific	2–11, 24, 25	18, 19, 25, 29	7–9, 20, 23–29
Middle Pacific	5, 6, 10, 30	3, 18–21	2–13, 17, 20, 27–29
South Pacific	3, 11	18–22	5–9, 12, 27

The most general, and, as a rule, severest cold spell of the month of January, 1904, began in the Pacific districts on the 18th, and continued in the several geographic districts as follows: North Pacific over the 20th; middle and southern Pacific over the 22d; middle Plateau 20th to 31st, inclusive, except the 22d; northern Plateau 25th to 31st, inclusive, except the 27th; southern Plateau 20th to 31st, inclusive, except the 25th; northern and middle slope 20th to 31st, inclusive; southern slope 21st to 31st, inclusive, except the 24th; North Dakota 19th to 28th, inclusive; Missouri Valley 20th to 31st, inclusive; upper Mississippi Valley, and west Gulf 22d to 31st, inclusive; the Lake region, Ohio Valley, and Tennessee, and east Gulf 23d to 31st, inclusive; south Atlantic 24th to 31st, inclusive; middle Atlantic and New England 25th to 31st, inclusive; and 24th, 25th, 30th, and 31st in the Florida Peninsula.

Overlapping and following the cold spells of the first six or seven days of the month of February, 1904, there were apparently a number of cold areas, so rapidly succeeding each other as to merge one with another, covering a much greater area, of longer duration, and marked severity, being especially severe in most of the districts on and immediately after the 15th.

Over the north and middle Pacific and the northern, middle, and southern slope districts the temperature was below the normal on the majority of the days of this month, but the daily departures were as a rule slight, and averaged only —0.8°, —0.6°, and —0.1° in the northern and middle Pacific and northern slope districts; in the southern and middle slope districts the plus departures were so very decided as to overcome the minus departures, and create an excess averaging +4.2° in the middle slope, and +7.9° in the southern slope.

TABLE 5.—*Dates when the temperature was 10° or more below the normal throughout each district.*

Districts.	December.	January.	February.
New England	15–18, 26–29	2–5, 18, 19, 28	6, 9–12, 16–18, 25–27
Middle Atlantic	15, 16, 27	3–6, 18, 19, 28	4, 9–13, 16–20, 25, 26
South Atlantic	2, 3, 11, 27	4–6, 19, 28–31	1, 10–13, 17, 18, 20
Florida Peninsula	1, 3, 4, 7, 8	14, 15	2
East Gulf	1–3, 6, 7	3–5, 26–30	1, 11, 12
West Gulf	2, 13, 14	3, 4, 26–29	19–21
Ohio Valley and Tennessee	1–3, 6, 10, 11, 13–15, 17, 26, 30	3–5, 26–28	1, 3, 4, 8, 10–12, 15–17, 19, 20
Lower Lake	13–16, 26, 28–30	2–5, 17, 18, 25, 27, 28	1, 3, 4, 8–12, 15–20, 25, 26
Upper Lake	11–15, 25, 28	1–4, 24–31	1, 3, 4, 7–12, 15–19, 24–26
North Dakota	4, 11–15	3, 20, 23–28	3, 6–11, 14, 15, 21–26
Upper Mississippi Valley	5, 10–15, 17, 25, 26, 30	2–4, 23–29	1–4, 8–12, 15–19, 22, 25
Missouri Valley	1, 4, 5, 10, 12–15	2, 3, 23–29	7–11, 14–19
Northern slope	12–14	24, 25	7–10, 14, 25
Middle slope	13, 14	2, 3, 25, 26, 28	9, 10, 19
Southern slope	15	2, 3, 28	10
Southern Plateau	None	None	None.
Middle Plateau	None	None	9
Northern Plateau	None	None	None.
North Pacific	None	None	None.
Middle Pacific	None	None	None.
South Pacific	None	None	None.

RECENT PAPERS BEARING ON METEOROLOGY.

Dr. W. F. R. PHILLIPS, Librarian, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

Science. New York. New Series. Vol. 19.

Taylor, Robert S. Levees, Outlets and Reservoirs as Means for Protection against Overflow of the Alluvial Lands of the Mississippi Valley below Cairo. Pp. 601–609.

Scientific American Supplement. New York. Vol. 57.

Byers, Charles Alma. Our Flood Warning Service. P. 23651.

Astrophysical Journal. Chicago. Vol. 19.

Baly, E. C. C. The Spectrum of the Aurora. Pp. 187–189.

National Geographical Magazine. Washington. Vol. 15.

Page, James. The Sailing Ship and the Panama Canal. Pp. 167–176.

Journal of Geography. Chicago. Vol. 3.

F., N. M. An Interesting Atmospheric Phenomena. Pp. 185–186.

Geographical Journal. London. Vol. 23.

Murray, John and Pullar, Laurence. Bathymetrical Survey of the Fresh-Water Lochs of Scotland. Pp. 444–473.

Proceedings of the Royal Society. London. Vol. 73.

Chree, C. An Inquiry into the Nature of the Relationship between Sun-spot Frequency and Terrestrial Magnetism. Pp. 198–201.

Simpson, George C. Atmospherical Radio-Activity in High Latitudes. Pp. 209–216.

Nature. London. Vol. 69.

—— Frost Effects at Niagara. P. 499.

—— Relation between Temperature and Elevation. Pp. 500–501.

—— Imperial Meteorology. Pp. 537–538.

Symons's Meteorological Magazine. London. Vol. 39.

—— The Dawson-Lander Sunshine Recorder. Pp. 21–22.